



Designation: **A 146 — 64 (Reapproved 2000) 146 — 04**

Standard Specification for Molybdenum Oxide Products¹

This standard is issued under the fixed designation A 146; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

- 1.1 This specification covers ~~three~~ four grades of molybdenum oxide, designated as A, B1, B2, and molybdc oxide briquets.
- 1.2 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

- 2.1 ~~ASTM Standards:~~

¹ This specification is under the jurisdiction of ASTM Committee ~~A-1~~ A01 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.18 on Castings.

Current edition ~~accepted Dec.~~ approved May 1, 1964; 2004. Published May 2004. Originally ~~issued~~ approved in 1932. Last previous edition approved in 1964 as A 146 – 64 (2000). Replaces A 146 – 63 T.

*A Summary of Changes section appears at the end of this standard.

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications Standards: ²

E 31 Methods

A 1025 Specification for Chemical Analysis of Ferroalloys Ferroalloys, General Requirements

3. Ordering Information

3.1 ~~Orders~~General Conditions for ~~m~~ Delivery

3.1 Materials ~~furn~~~~ish~~~~er~~ ~~to~~ this specification shall ~~include~~ conform to the following information:

3.1.1 ~~Quantity,~~

3.1.2 ~~Name~~ requirements of material,

3.1.3 ~~ASTM designation and year of issue,~~

3.1.4 ~~Grade,~~

3.1.5 ~~Size, if appropriate, and~~

3.1.6 ~~Requirements for packaging, analysis reports, etc. as appropriate.~~

3.2 ~~Although molybdenum oxide is ordered by total net weight, or contained weight, Specification A 1025, including any supplementary requirements that are indicated in the customary basis purchase order. Failure to comply with the general requirements of payment is per pound Specification A 1025 constitutes nonconformance with this specification. In case of contained molybdenum, conflict between the requirements of this specification and Specification A 1025, this specification shall prevail.~~

4. Chemical Requirements

4.1 The various grades shall conform to the requirements as to chemical composition specified in Tables 1 ~~and 2.~~

4.2 The manufacturer shall furnish an analysis of each shipment showing the ~~elements specified in Table 1.~~

4.3 ~~The values shown in Table 2 are expected maximums. Upon request percentage of the purchaser, the manufacturer shall furnish an analysis for any of these elements on a cumulative basis over a period mutually agreed upon by the manufacturer and the purchaser. each element specified.~~

5. Size

5.1 ~~Molybdenum oxide is available in bags, steel drums, or other suitable containers, each with either 5 lb (2.3 kg) or 20 lb (9.1 kg) of contained molybdenum.~~

5.2 ~~Molybdic oxide briquets weigh about 5 lb each and contain 2.5 lb (1.13 kg) of molybdenum.~~

6. Sampling

6.1 *Sampling Small Bags*—When packed in the standardized small packages, each holding contained molybdenum, the material shall be sampled by selecting at random one twentieth of the bags that may bear the same manufacturing lot number, and the combined content of these bags shall be reduced and analyzed as a separate sample. When a shipment cannot be divided by lot numbers, one twentieth of the total number of bags constituting the shipment shall be selected and treated as one sample. The material forming a sample shall be crushed if necessary, and in any event passed through a No. 10 (2.00-mm) sieve. The sample after sieving shall be thoroughly mixed by coning and then reduced to about 2 lb (0.9 kg) by quartering or by means of a riffle

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards*, Vol 14.02, volume information, refer to the standard's Document Summary page on the ASTM website.

TABLE 1 Chemical Requirements^A

	Molybdenum Oxide			Molybdic Oxide Briquets
	Grade A	Grade B1	Grade B2	
Molybdenum, min ^B	55.0	57.0		51.6
Molybdenum, min	55.0	57.0	57.0	51.6
Sulfur, max	0.25	0.10		0.15
Sulfur, max	0.25	0.10	0.10	0.15
Copper, max	1.0	1.0 ^C		0.15
Copper, max	1.0	1.0	0.15	0.15

^AFor purposes of determining conformance with this specification, the reported analysis shall be rounded to the nearest unit in the last right hand place of figures used in expressing the limiting value, in accordance with the rounding method of Practice E 29.

^BFor the purposes of determining the molybdenum content of any shipment, molybdenum shall be reported to the nearest 0.1 %, applying the same rounding procedure as prescribed in Footnote A.

^CCopper content may be supplied to 0.15 %, max, when requested by the purchaser.

sampler. The reduced sample shall then be crushed and passed through a No. 60 (250-µm) sieve. The sample after sieving shall again be mixed by coning and then divided through a riffle, preferably a Jones divider, into the required number of analytical samples.

65.2 Sampling Large Containers—When packed in drums or large bags or cartons, the material shall be sampled by selecting about one twentieth of the content of each package that may bear the same manufacturing lot number, and the combined material selected shall be reduced and analyzed as a separate sample. When a shipment cannot be divided by lot numbers, about one twentieth of the content of each package in the shipment shall be selected, and the combined material selected shall be treated as one sample. The material comprising a sample shall be thoroughly mixed by coning and reduced by half-shoveling, alternating the operations until the residual weight reaches about 40 lb (18.1 kg). Segregation of sizes shall be carefully avoided. The sample thus reduced shall be crushed, if necessary, to pass through a No. 10 (2.00-mm) sieve, and the subsequent sampling procedure shall be as prescribed in ~~6.1~~ 5.1.

65.3 Correcting Sample to Dry Net Weight—Absorption of moisture by the material would depress the analytical percentages with respect to the dry basis, on which the product was analyzed when packaged. Accordingly, any analytical sample shall be dried at 110°C, before analysis, and the sampler's moist net weight of the shipment, of a manufacturing lot, or of any constituent package shall be appropriately corrected to the corresponding dry weight, thus leading to the proper weight of contained molybdenum.

7. Chemical Analysis

~~7.1 The chemical analysis of the material shall be made in accordance with the procedure for molybdenum oxide as described in Methods E 31, or alternative methods which will yield equivalent results.~~

~~7.2 If alternative methods of analysis are used, in case of discrepancy, Methods E 31 shall be used for referee.~~

~~7.3 Where no method is given in Methods E 31 for the analysis of a particular element, the analysis shall be made in accordance with a procedure agreed upon between the manufacturer and the purchaser.~~

8. Inspection

~~8.1 The manufacturer shall afford the inspector representing the purchaser all reasonable facilities, without charge, to satisfy him that the material is being furnished in accordance with this specification.~~

9. Rejection

~~9.1 Any claims or rejections shall be made to the manufacturer within 45 days from receipt of material by the purchaser.~~

10. Marking

~~10.1 When the shipment is made in containers each shall be marked on the container or on a label or tag attached thereto. The marking shall show the material, the grade designation, the ASTM designation, the size, the lot number, gross, tare, and net weight, and the name, brand, or trademark of the manufacturer.~~

11. Packaging

~~11.1 The molybdenum oxide shall be packaged in sound containers in such a manner that none of the product is lost or contaminated in shipment.~~

12.

6. Keywords

~~126.1~~ molybdenum; molybdenum oxide

SUPPLEMENTARY REQUIREMENTS

S1. The composition shall be further limited by the requirements of Table S1.1 in addition to those in Table 1.



TABLE S1.1 Supplementary Chemical Requirements

	Composition, % ^A		
	Molybdenum Oxide		Molybdic Oxide Briquets
	Grade A	Grade B1 and B2	
Carbon	trace	trace	12.0 (approx)
Phosphorus, max	0.050	0.050	0.050

^AThe values shown are maxima. Upon request of the purchaser, the manufacturer shall furnish an analysis for any of these elements on a cumulative basis over a period mutually agreed upon by the manufacturer and the purchaser. An analysis of each lot is not required.

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last version (A 146 – 64 (2000)) that may impact the use of this standard.

- (1) Practice E 29, and Test Methods E 31 were removed from 2.
- (2) Specification A 1025 was added to 2.
- (3) Changed Ordering Information to General Conditions for Delivery.
- (4) Revised Section 4.
- (5) Removed sections on Size, Chemical Analysis, Inspection, Rejection, Marking, and Packaging.
- (6) Changed Grade B to Grade B1 and added Grade B2 to Table 1.
- (7) Added Supplementary Requirements section.
- (8) Changed Table 2 to Table S1.1.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).